

WHAT IS CLAIMED IS:

1. A solid image-pickup device, comprising:  
a lens array formed by arranging a plurality of  
resin lenses in a manner to form a matrix;  
5 an undercoat layer for fixing said micro lens  
array and having a ditch formed between said adjacent  
resin lenses; and  
a transparent resin layer covering said plural  
resin lenses with substantially the same thickness and  
10 the ditch between said adjacent resin lenses.

2. The solid image-pickup device according to  
claim 1, wherein the minimum thickness of said  
transparent resin layer in the ditch between said  
adjacent resin lenses in the diagonal direction of said  
15 lens array is smaller than the minimum thickness of  
said transparent resin layer in the ditch between  
adjacent resin lenses in the arranging direction of  
said lens array.

3. The solid image-pickup device according to  
20 claim 1, wherein the gap in the arranging direction of  
said lens array between adjacent micro lenses each  
consisting of said resin lens and said transparent  
resin layer covering the surface of said resin lens  
falls within a range of between  $0.005\ \mu\text{m}$  and  $0.3\ \mu\text{m}$ .

25 4. The solid image-pickup device according to  
claim 1, wherein the thickness of said transparent  
resin layer on the surface of said resin lens falls

within a range of between  $0.01\ \mu\text{m}$  and  $0.3\ \mu\text{m}$ , and the depth of said ditch falls within a range of between  $0.05\ \mu\text{m}$  and  $1.5\ \mu\text{m}$ .

5        5. The solid image-pickup device according to claim 1, wherein said undercoat layer is formed of a transparent resin having an etching rate higher than that of said resin lens.

10       6. The solid image-pickup device according to claim 1, wherein the gap between adjacent resin lenses in the arranging direction of said lens array is not larger than  $0.6\ \mu\text{m}$ .

15       7. A solid image-pickup device, comprising:  
a lens array formed by arranging a plurality of resin lenses in a manner to form a matrix;  
an undercoat layer for fixing said micro lens array and having a ditch formed between adjacent micro lenses; and

20       a transparent resin layer covering said plural resin lenses and said ditch,  
wherein the difference between the height of the surface of said transparent layer in the ditch in the diagonal direction of said lens array and the height of the tops of micro lenses each consisting of said resin lens and said transparent resin layer covering the  
25       surface of said resin lens is larger than the difference between the height of the surface of said transparent layer in the ditch in the arranging

direction of said lens array and the height of the top of the micro lens.

8. The solid image-pickup device according to claim 7, wherein the gap between adjacent micro lenses in the arranging direction of said lens array falls within a range of between 0.005  $\mu\text{m}$  and 0.3  $\mu\text{m}$ .

9. The solid image-pickup device according to claim 7, wherein the thickness of said transparent resin layer on the surface of said resin lens falls within a range of between 0.01  $\mu\text{m}$  and 0.3  $\mu\text{m}$ , and the depth of said ditch falls within a range of between 0.05  $\mu\text{m}$  and 1.5  $\mu\text{m}$ .

10. The solid image-pickup device according to claim 7, wherein said undercoat layer is formed of a transparent resin having an etching rate higher than that of said resin lens.

11. The solid image-pickup device according to claim 7, wherein the gap between adjacent resin lenses in the arranging direction of said lens array is not larger than 0.6  $\mu\text{m}$ .

12. A method of manufacturing a solid image-pickup device, comprising the steps of:

forming a photosensitive resin layer on an undercoat layer;

25 exposing said photosensitive resin layer to light in a predetermined pattern, followed by a developing treatment so as to form a resin pattern layer having a

predetermined gap width;

subjecting said resin pattern layer to a heat flow so as to form a resin lens array which is 2-dimensionally arranged a plurality of resin lenses;

- 5           applying an etching treatment to those portions of said undercoat layer which are exposed in regions between adjacent resin lenses to form ditches; and  
forming a transparent resin layer on the surfaces of said resin lenses and said undercoat layer.

10           13. The method of manufacturing a solid image-pickup device according to claim 12, wherein said ditches are formed in a depth falling within a range of between 0.05  $\mu\text{m}$  and 1.5  $\mu\text{m}$ .

15           14. The method of manufacturing a solid image-pickup device according to claim 12, wherein the gap width between adjacent resin lenses in the arranging direction of said resin lens array after formation of said ditches is not larger than 0.6  $\mu\text{m}$ .

20           15. The method of manufacturing a solid image-pickup device according to claim 12, wherein said transparent resin layer is formed on the surface of each of said resin lenses in a thickness falling within a range of between 0.01  $\mu\text{m}$  and 0.3  $\mu\text{m}$ .